Refractories in the Hands of the User. Refractory Highly Aluminous Bricks for Ladles and Arresting Tubes Made of a Substance Composed of Mullite and Corundum

shearing damage was found to occur.
2.) These bricks are highly resistant against slag.
Some industrially produced sets of arresting tubes were also manufactured, which is described in detail. They were tested in practice under the most difficult conditions (vacuum casting) and showed highly satisfactory results. There are 5 Slavic references.

ASSOCIATION: Podol'sk Plant for Refractories (Podol'skiy zavod ogneuporov)

AVAILABLE: Library of Congress

Card 2/2

KRASOTKIN, K.A.

25(1) PHASE I BOOK EXPLOITATION SOV/1708

Ogneupory dlya chernoy metallurgii; sbornik statey (Refractories in Ferrous Metallurgy; Collection of Articles) Moscow, Metallurgizdat, 1958. Errata slip inserted. 4,000 copies printed.

Ed.: B. I. Gavrish, Engineer; Ed. of Publishing House: I. P. Kirsanov; Tech. Ed.: A. I. Karasev.

PURPOSE: This book is intended for engineers and technicians working in ferrous metallurgy.

COVERAGE: The book consists of 20 articles on the development and use of refractories in the Soviet metallurgical industry. B. I. Gavrish, in the first paper, presents the prospects for development and research projects for the period 1959-1965. He emphasizes development of refractory plants in the eastern part of the USSR. In general the articles deal with recent developments in basic and acidic refractories for blast and open hearth furnaces, and for the lining of ladles and special equipment used in continuous casting and in vacuum treatment of steel. A. S. Berezhnoy discusses the technology of manufacturing magnesite and forsterite refractories which frequently replace Dinas brick and fire clay. Several authors state that good results were obtained with

Card 1/5

periclase-spinell brick and with bricks made of magnesium and chromite compounds. The application of new refractories, insulating materials, high-temperature mortars, binding media, and cements, combined with advanced techniques in lining furnaces, are said to have more than doubled the time intervals between relining and overhauling furnaces. O. M. Margulis and A. G. Khomalov discuss the use of "tagged atoms" to determine the degree of contamination of steel by refractory-lining particles. K. S. Losnyak describes the production of refractories by the semidry pressing method employed at the Nizhne-Tagil' plant, and I. S. Kaynarskiy and V. D. Tsigler cover the use of lightweight Dinas bricks in industrial furnaces. The last paper written by A. E. Makarychev compares and evaluates the physical properties and service life of fire-clay bricks, forsterite bricks, Dinas bricks and bricks with high alumina content. Graphs, diagrams, and photographs accompany the papers. For references, see Table of Contents.

TABLE OF CONTENTS:

Refractories in Ferrous Metallurgy (Cont.) SOV/1708

Card 2/5

K.A.

AUTHOR: Kirsanov, I. P. SOV/131-58-7-12/14

TITLE: Conference of the Specialists for Refractories of the Moscow Oblast (Konferentsiya ogneuporshchikov moskovskoy oblasti)

PERIODICAL: Ogneupory, 1958, Nr 7, pp 332 - 334 (USSR)

ABSTRACT: From May 12 - 13, 1958, an administrational and technical conference took place at the Snigirevskiy Works for Refractories. It had been called by the administration of the metallurgical industry as well as by the technical administration of the Oblast' Council of National Economy, and it dealt with the exchange of opinions on mechanization in the works for refractories of the Moscow oblast. The conference was attended by outstanding members from the staff of enterprises, engineers, technicians, commercial managers of the works for refractories in the Moscow Oblast as well as by representatives of the works of refractories in the Sverdlovsk, Stalino, Zaporozh'ye, Novgorod, and Tula oblasts of the scientific research and planning institutes. 15 reports and communications were heard. The Chief Engineer of the metallurgical administration of the Council of National Economy of Moscow Oblast S.M.Yegorov, opened the conference with a survey of the achievements of the works in the Moscow oblast. He stressed

Card 1/3

the low technical level of these works. Other reports were delivered by:

1) V.I.Sokolov and I.G.Ul'fskiy on the mechanization plans, on the automation of production processes, as well as on the modernization of the Leningrad Institute for Refractories.
2) K.A.Krasotin, D.S.Rutman and I.A.Suvorov on the modernization and mechanization of the Podol'sk works by its laborers and staff.
3) L.V.Vinogradova on highly-refractory products.
4) D.N.Poluboyarinov, Professor, Doctor of Technical Sciences, on the oxides of various metals used for the production of refractories.
5) M.I.Gurova and M.I.Krivoy on the introduction of new refractories in the Snigirevskiy works.
6) M.A.Rabinovich on measures taken for improving the work of the heating aggregates at the Snigirevskiy works.
7) T.A.Reyngard on improvements in the Vnukovo works.
8) M.F.Shcheglova on rationalization work in the Domodedovo works.
9) Z.Ye.Dobrin on experiments at the Borovichi kombinat for refractories.

Conference of the Specialists for Refractories of the Moscow Oblast SOV/ 131-58-7-12/14

1o)M.P.Dovnar on the dust removal in the Stalinogorsk works.
11)S.D.Skorokhod on demands set up by the metallurgists of the "Elektrostal' " works concerning refractories.
The participants approved of the measures outlined by the Moscow Oblast Council of National Economy to be taken for a further perfection and an increase of the production of the works in the area. It was recommended to intensify research work.

1. Ceramic materials--USSR 2. Conferences

Card 3/3

MALKINA, Kh.E.; KRASOTINA, A.N.; Prinimali uchastiye: ZUBKOVA, I.A.; RYZHKOVA, K.A.; SALOMASOVA, A.M.

Compounding formula, manufacture, and uses of carbon black-free lubricants for vulcanization molds. Kauch.i rez. 20 no.7:30-33 Jl '61. (MIRA 14:6)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti.
(Vulcanization--Equipment and supplies)
(Lubrication and lubricants)

KRASOTINA, V.S.

Binocular asymmetry of the visual field. Uch.zap.Len.un. no.185: 152-156 '54. (MLRA 8:10)

(Sight)

ACCESSION NR: AP4037565 S/0056/64/046/005/1556/1560

AUTHORS: Bazilevskaya, G. A.; Krasotkin, A. F.; Charakhch'yan, A. N.

TITLE: Energy spectrum and total number of x-ray photons in extensive air showers of cosmic rays

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 5, 1964, 1556-1560

TOPIC TAGS: cosmic ray, extensive air shower, x-ray photon equilibrium spectrum, electron photon cascade

ABSTRACT: In view of the discrepancy between the previously calculated equilibrium spectrum of low-energy (x-ray) photons produced in electron-photon cascades generated by primary electrons or photons of relatively high energy (ZhETF v. 40, 1602, 1961) and the experimental data with scintillation counters on pilot balloons, the experiments on the low-energy photons have been repeated in extensive air showers, in which the overwhelming majority of particles are

Card 1/3

ACCESSION NR: AP4037565

electrons and photons, and concerning which there are still few data in the literature. The measured energy spectrum and the total number of x-ray photons in the EAS were found to be in agreement with the calculations for the equilibrium spectrum of photons produced in electron-photon cascades. The measurements were made by two methods; by recording the number of triple coincidences in scintillation counters and by recording quadruple coincidences for three gas-discharge and a single scintillation counter. The disparity with the data obtained in the measurements with the aid of triple coincidences is explained. Orig. art. has: 3 figures and 5 formulas.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

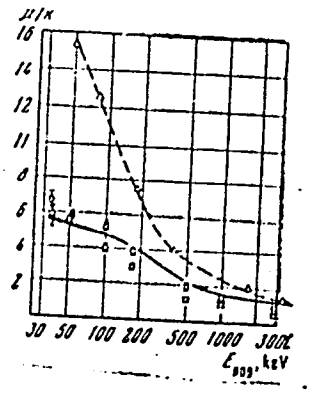
SUBMITTED: 11Oct63 DATE ACQ: 09Jun64 ENCL: 01

SUB CODE: GP, NP NR REF SOV: 002 OTHER: 003

Card 2/3

ACCESSION NR: AP4037565

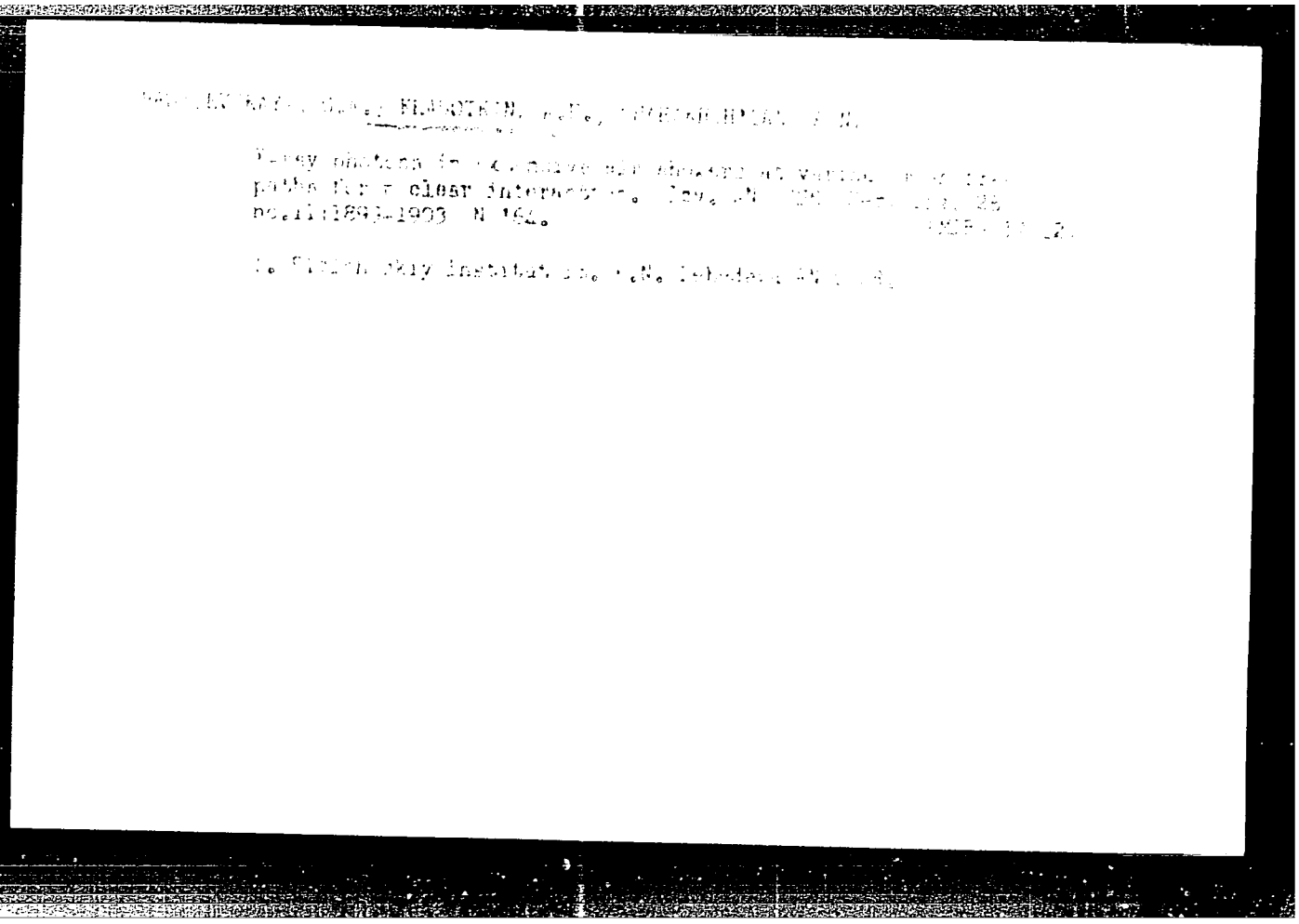
ENCLOSURE: 01



Ratio of number of flashes due to photons in the scintillator, to the number of flashes produced by the electrons, as a function of the energy-release threshold E_{thr}: Δ- measurements in the stratosphere. The EAS measurement data are as follows:
○ - with the aid of three scintillation counters,
□ - with the aid of three gas-discharge and one scintillation counter; continuous line - results of calculations.

Abscissa - E_{thr}, keV; ordinate - number of flashes in counter.

Card 3/3



L 4492-66 EWT(1)/FCC/EWA(h) GW

ACC NR: AP5024659 SOURCE CODE: UR/0048/65/029/009/1774/1776

AUTHOR: Bazilevskaya, G.A.; Kvashnin, A.N.; Krasotkin, A.F.; Filatov, V.M.; Charakhchyan, A.N.

ORG: Physics Institute im P.N.Lebedev, Academy of Sciences, SSSR (Fizicheskiy institut Akademii nauk SSSR)

TITLE: Radiosonde for measurement of x rays in the stratosphere /Report, All-Union Conference on Cosmic Ray Physics held at Apatity 24-31 August 1964/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v 29, no 9, 1965, 1774-1776

TOPIC TAGS: x ray, stratosphere, secondary cosmic ray, radiosonde

ABSTRACT: There are briefly described two radiosondes for measuring x rays in the stratosphere. Both instruments employ NaI:Tl scintillators and vacuum tube electronics and are battery powered with transistor voltage convertors The lighter instrument weighs 2.5 kg and records photons with energies above 30-35 keV. The second instrument weighs 6 kg and its threshold is adjustable from 20 to 360 keV by a system of relays, so that photon energy spectra can be recorded. Schematic diagrams are given for both instruments, but not for their power supplies or for the relay system. Altitude versus counting rate curves recorded over Dolgoprudnyy are presented. Orig. art. has: 4 figures.

SUB CODE: NP,OP,EC/ SUBM DATE: 00/ ORIG REF: 002/ OTH REF: 000

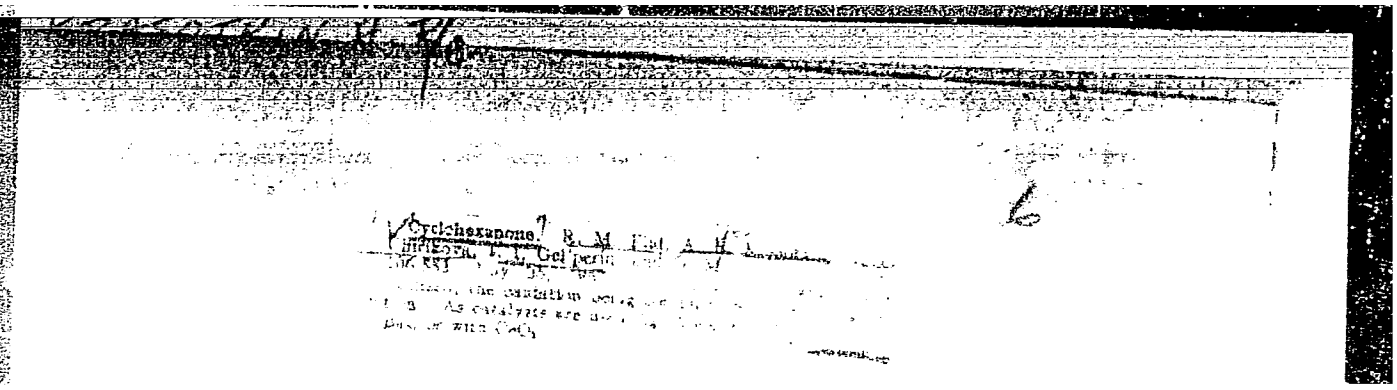
Card 1/1

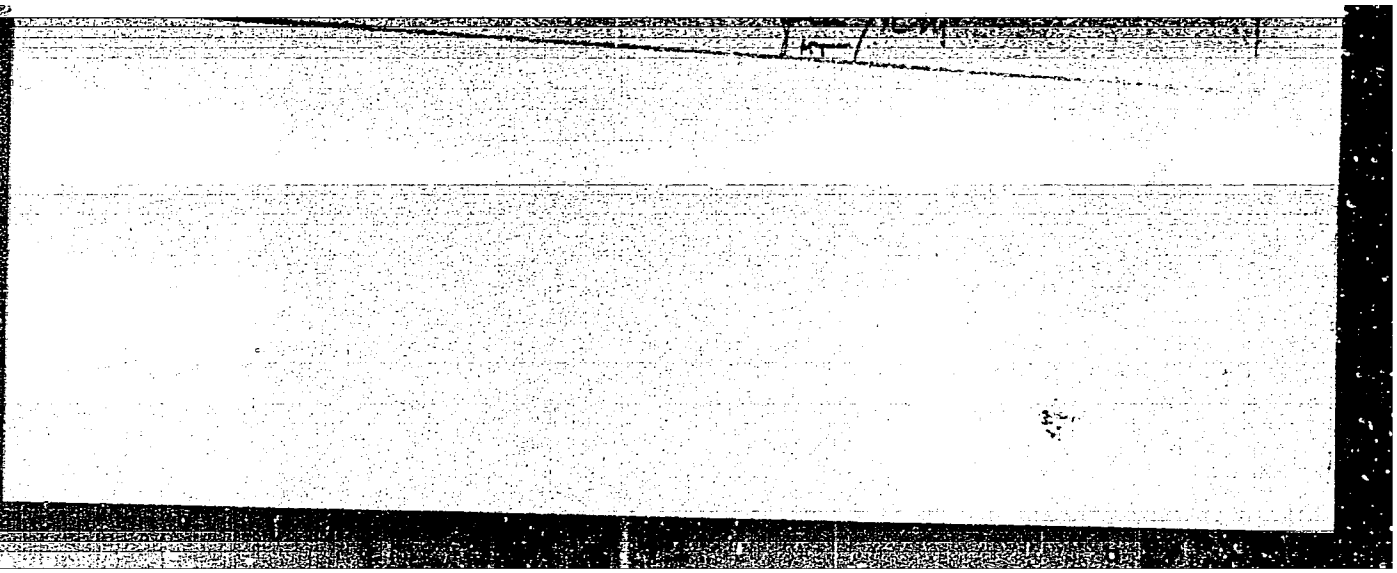
0901 0400

KRASOTKIN, A.T.

We are raising Peking ducks. Ptitsevodstvo 8 no.11:22 N '58.
(MIRA 11:11)

1. Inspektor otdela kadrov Kalininskogo gorptshchekombinata.
(Ducks)





FLID, R.M.; KRASOTKIN, A.Ye.; SHPICHINETSKAYA, L.S.; CHIRIKOVA, A.V.; BELYY, A.P.; BARATS, M.I.; KRUPTSOV, B.K.; BELYANINA, Ye.T.

Effect of alcaline admixtures on catalytic oxidation of primary alcohols to aldehydes. Khim.nauk i prom. 3 no.5:683 '58.

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M.V. Lomonosova.

(Alcohol) (Oxidation) (Catalysts)

FLID, R.M.; KRASOTKIN, A.Ye.

Preparation of aldehydes and ketones by a combined catalytic oxidation and dehydrogenation of alcohols. Kin.i kat. 3 no.2:282-288 Mr-Ap '62. (MIRA 15:11)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni Lomonosova.
(Aldehydes) (Ketones) (Alcohols)

1. KIRSOTKIN, N. Ye, ANDREYEV, V.D., BOGOSLOVSKIY, P.N., Engs.

2. USSR (600)

4. Filters And Filtration

7. Automatizing quarts and cationite filters of chemical, water purifying installations of electric power plants., Izv. VTI, 21, No.11, 1952

9. Monthly List of Russian Accessions, Library of Congress, February 1953, Unclassified.

KRASOTKIN, S.G., inzhener; SEGERKRANTS, I.V., inzhener; BATENEV, I.M., arkhitektor.

Standard desing for a sintering plant. Stroi.prom. no.8:21-28 Ag '57. (MIRA 10:10)

1. Institut mekhanicheskoy obrabotki poleznykh iskopayemykh, Leningrad.
(Metallurgical plants--Design and construction)

KRASOTKIN, S.G., inzh.; SEGERKRANTS, I.V.

Characteristics of planning ore preparation plants. Prom. stroi. 37 no.4:8-13 Ap '59. (MIRA 12:6)

1.Institut Mekhanobr, Leningrad.
(Ore dressing--Equipment and supplies)

1. KRASOTKIN, Ye. N.; AVDEYEV, V. D., Engs.; BOGOSLOVSKIY, P. N.

2. USSR (600)

4. Electric Power Plants

7. Automatizing quarts and cationite filters of chemical, water purifying installations of electric power plants, Izv. VTI, 21, No. 11, 1952.

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

1. [redacted], V. I. N., [redacted], L. Z.

2. USSR (600)

4. Creep of Metals

7. Automatization of the IP-2 type machines [redacted] creep in metals, Vest. mash. 33 No. 2, 1953.

9. Monthly List of Russian Accessions, Library of Congress, June 1953. Unclassified.

KRASOTKIN, YE.N.

USSR/Chemical Technology - Chemical Products and Their Application. Water treatment. Sewage water. I-11

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 12810

Author : Krasotkin Ye.N.
Title : Automation of Units for Chemical Pretreatment of Water

Orig Pub : Inform. materialy po ekonomii energii i ekspluat. elektrooborudovaniya (sb. No 24). Molotov, 1954, 34-48

Abstract : Considered are the units and operations subject to automation at water pretreatment installations of electric power plants, principal schemes of automatic devices for washing of clarification filters and regeneration of cathionite filters, schemes of automatic devices for preparation and feeding of regenerating solutions, and also automation equipment.

Card 1/1 - 196 -

AID P - 3613

Subject : USSR/Engineering

Card 1/1 Pub. 28 - 4/7

Author : Krasotkin, E. N.

Title : Apparatus for measuring concentrated solutions

Periodical : Energ. byul, 10, 20-22, 1955

Abstract : The author describes a concentrate meter used at a power plant of the Moscow Regional Power System. The apparatus automatically and continuously measures a concentrated solution, such as sulfuric acid, sodium chloride and sodium carbonate. The specific electrical conductivity of the solvent serves as an indicator of the reagents present in the solution. Two drawings illustrate construction and function.

Institution : Moscow Regional Power System (MOSENERGO)

Submitted : No date

Krasotkin, Ye. N.

Salt-meter without degassing for water with low salt concentrations. B. N. Krasotkin and A. G. Shchukina. *Priborostroenie* IV, 11-12(1957).—The construction of a continuous instrument to measure salt concns. of 0–0.5 mg./l. is described. The usual calibration with the help of standard solns. was impossible as solns. below 1 mg./l. absorb gases, causing deviations in the electrocond. of the soln. The described instrument permits calibration by measuring resistances. The principal element of the instrument is a transmitter, consisting of an outside and inside electrode hooked into one branch of an unbalanced resistance bridge, the diagram of which is given. The external electrode (I) consists of a stainless-steel tube 48 mm. in diam. × 3 mm. thick, polished inside. A threaded conical nipple screwed on the bottom of the tube admits the soln. to be measured through another tube. The bottom of I is closed by an insulating insert (II), one side of which is conical and the reverse flat with a nest for the internal electrode. Eighteen 3 mm. diam. holes through II admit the soln. to the inside of the electrode chamber. The internal electrode consists of a tube 25 mm. in diam. and 1 mm. thick, closed at one end, mounted in the nest of II concentrically with I. Into this tube a Cu resistance thermometer is tightly fitted in. The coil of the thermometer consists of 0.07–0.10 mm. thick wire (resistance at 0° of 1575 ohm). The whole assembly is capped by a split head made of an insulating material with tangential holes to release the soln. A shunting resistance for temp. compensation of 1385 ohm and 2 terminals are attached to one side of the head. The normal vol. that can be handled is 20 L./hr., but it can be raised to 150 l./hr. without affecting accuracy. B. Krasotkin

1/1

KRASOTKIN, Ye. N.

SOV/24-58-10-34/34

AUTHOR: Solomonov, M. S.

TITLE: Conference on Water Preparation in Thermal Power Stations (O vodopodgotovke na teplovykh elektrostantsiyakh)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 10, pp 159-160 (USSR)

ABSTRACT: During June 24-27, 1958, a conference took place on problems of water preparation in thermal power stations of high, intermediate, super-high and super-critical pressures. The conference was convened by the Commission on Steam of Very High Parameters of the Power Research Institute, Academy of Sciences USSR, imeni G. M. Krzhizhanovskiy, jointly with the Ministry of Power Stations USSR and the Moscow Scientific-Technical Society of the power industry. Over 400 representatives of scientific research establishments and of power stations participated. In the section on design, setting and operation of combined plant with magnesium desilisizing, the following papers were read:
1) "Experience in setting up and operation of water treatment plant with desilisizing by means of magnesium", V. F. Gvozdev (ORGRES);
2)"State and tasks in the development of plant for magnesium desilisizing of water in thermal power stations", V. M. Kvyat-

Card 1/5

Conference on Water Preparation in Thermal Power Stations

kovskiy (VTI).
3) "Schemes of automation of plant with desilisizing by means of magnesium", Ye. N. Krasotkin and V. M. Kvyatkovskiy (VTI),
4)"Problems of designing combined cathion water treatment plants with magnesium desilisizing", A. A. Krupchitskiy (Khar'kovskoe otdeleniye TEP),
5) "Desilisizing of the water by means of filters", O. N. Shemyakin (VODGEO).
6)"Investigation of the process of magnesium desilisizing of water at elevated temperatures", L. M. Zhivilov (VTI),
7)"Magnesium-cathion method of desilisizing water", L. S. Foshko (Donbassenergo).
In the second section, "Experience in designing, setting and operation of chemical desalting plant", the following papers were read:
1) "Results of investigations and of industrial tests of chemical desalting plant and prospects of their application in thermal power stations with super-high and above-critical steam parameters", F. G. Prokhorov (MES SSSR).

Card 2/5

Conference on Water Preparation in Thermal Power Stations

2) "New ionites for water preparation plant and prospects of their industrial manufacture", A. V. Pashkov (Institut plastmass im. Frunze),
3)"Problems of design of chemical desalting plant", V. S. Chernov (KhOTEP), I. M. Sokolov,
4) "Automation of pressure filters for water treatment in power stations", S. M. Gurvich (MOTsKTI).
In addition to these papers, 20 informative communications of various local representatives were presented. It transpired that during recent years methods of magnesium desilisizing and of thorough chemical desalting of water have gained extensive utilisation in Soviet power stations and these played an important role in the development of Soviet steam power. Successful mastering of magnesium desilisizing of water together with the application of stepwise evaporation in boilers, washing of steam and other measures enabled ensuring reliable and economic exploitation of high pressure (110 atm) boilers in combined heat and power stations which operate with a large loss of condensate. During recent years rational designs of illuminators have been developed and also methods for dry dosing of caustic magnesite as well as mechanization of its handling and an original method was described

Conference on Water Preparation in Thermal Power Stations

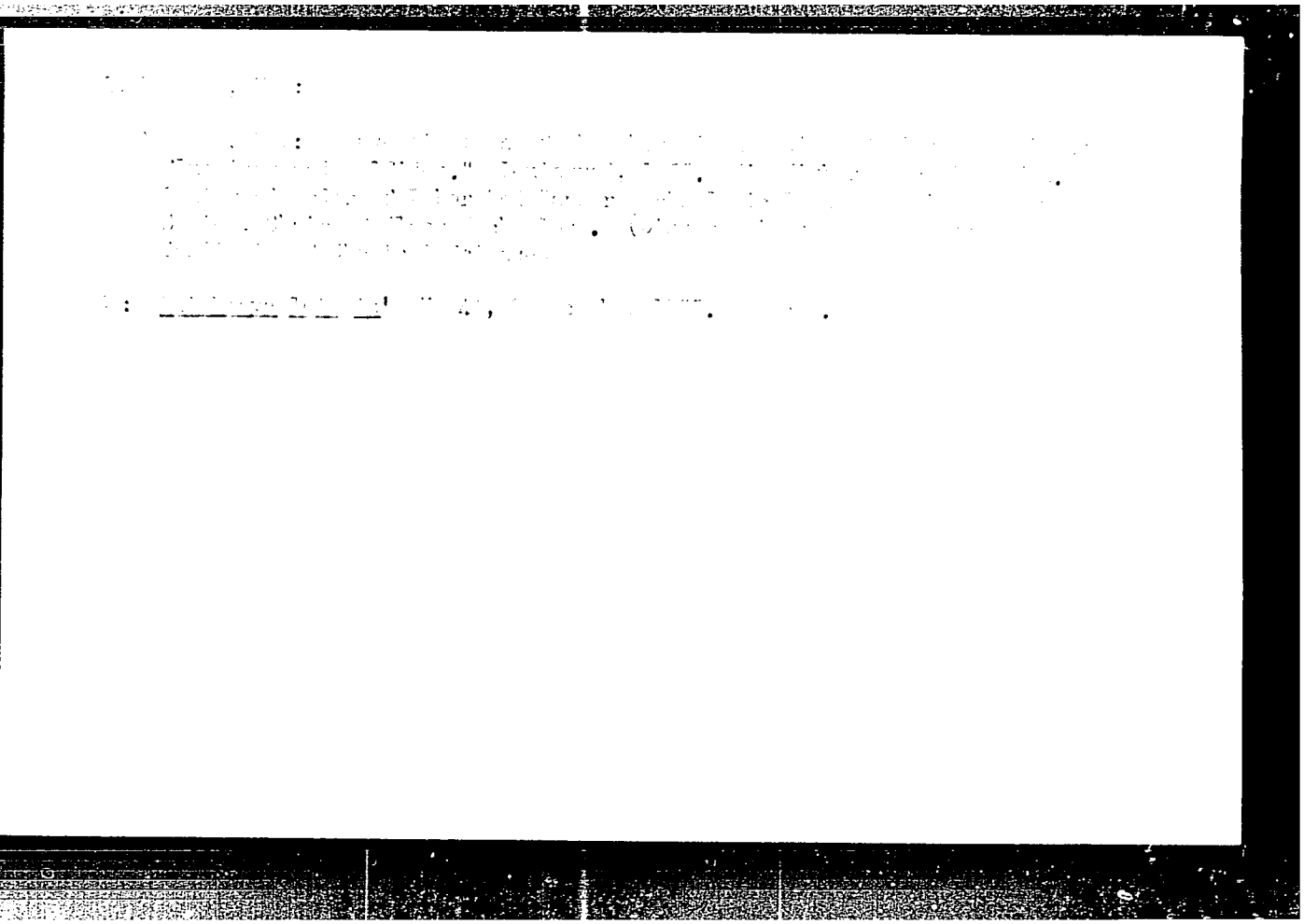
of desilisizing by applying lime on the preliminarily magnesium-cathionated water. In individual cases it became possible to feed the water directly from the illuminators into cathion filters of the first stage, in which the processes of filtration and cathion treatment are combined. Work has started on automation and mechanisation of preliminary purification and of introducing treatment involving high temperature pre-heating of the water. Water treatment by application of lime and in individual cases by simultaneous desilisizing by magnesium in the case of heating up to 120°C permits more thorough elimination of silicon compounds. High temperature desilisizing requires special apparatus operating under pressure, thermally stable cathions and also new automatic circuits. Laboratory, semi-industrial and industrial tests of the filtration method of desilisizing water, developed by VODGEO have shown that this method is applicable also for H-a cathionated water without preliminary application of lime. In chemical desalting plants which use ionites of Soviet manufacture, it became possible to solve the problem of feeding very high pressure drum boilers (180 atm) and thus extensive prospects are opened up of using thoroughly desalted natural

Conference on Water Preparation in Thermal Power Stations

water and condensates for feeding powerful direct flow boilers of super-critical pressures. An ionite method of purification of condensates of nitrogen-fat plants permits utilising desalted condensate for feeding high pressure boilers and returning regeneration products into the technological cycle of the plant for producing from it the industrial product. Such a process of purification of the waste condensates allows reducing operational costs for water treatment and feeding of industrial heat-power stations in chemical works. Various deficiencies were pointed out in the existing technology of water purification as well as in the designs adopted in some of the projects.

Card 5/5

USCOMM-DC-60,653



KRASUTKINA, N.I.

Thermal expansion of sodium silicate glasses containing fluorides. V. V. Vargin and N. I. Krasutkina. *Proc. Acad. Sci. U.S.S.R., Sect. Chem. Technol.* 103, 75–8 (1958) (English translation).—See *C.A.* 51, 1501*f*. B. M. W.

Krasotkina, N.I.

Thermal expansion of sodium silicate glasses containing fluorides. V. V. Vargin and N. I. Krasotkina (Lensovet Technol. Inst., Leningrad). *Doklady Akad. Nauk S.S.S.R.* 108, 1133-6(1956).—During annealing, many F-contg. glasses show a tendency to crack; V. and K. investigated the thermal expansions of such glasses with systematic additns. of 3 to 12 parts F (introduced as Na_2SiF_6) per 100 parts of the glasses of the compns. $Na_2O.2SiO_2$, $Na_2O.3SiO_2$, and $Na_2O.4SiO_2$. The dilatometric measurements were made with a "dilatometer" with a micrometric magnifying of 1 to 1.5% for the expansion coeff. One series of these glasses was heated to 500°, another series to 780°; the samples were cooled with the furnace. In the first series the expansion coeff. data are higher than in the F-free glass $Na_2O.2SiO_2$ if the F addn. is 3 parts. They are lower if 6 or 9 parts F are added, and for 12 parts still lower. The softening points are decreased in glass $Na_2O.3SiO_2$ for 3, 6, and 9 parts F, increased for 12 parts. In the 2nd series a basic change of the expansion mechanism occurs, especially a strong effect is observed at 200° to 220° which is increased with increasing F contents. It corresponds to the α ⇌ β inversion of cristobalite. The higher softening temps. indicate the presence of NaF. These effects are even more pronounced in the glass $Na_2O.4SiO_2$ with 6 parts F, but weak in $Na_2O.2SiO_2$ with 9 and 12 parts F (with crystn. of cristobalite). In general, not only the temp. of the thermal treatment but also the time of the thermal exposure and the cooling rates definitely affect the expansion properties of F glasses. Besides cristobalite, also tridymite (indicated by its inversion effects at 120° to 190°) is formed if the glasses are exposed for some time at 680° to 780°. There is, however, also some inversion of tridymite into cristobalite.

W. Eitel

VARGIN, V.V., professor; KRASOTKINA, M.I.

Causes of cracks in superposed milk glass products. Stek.i ker. 14 no.7:8-11 Jl '57. (MIRA 10:8)
(Glass--Testing) (Glass manufacture--Chemistry)

VARGIN, V.V.; KRASOTKINA, N.I.

Investigation of the crystalline phases of fluorine containing sodium calcium silicate glasses. Trudy LTI no.49:113-118 '58. (MIRA 15:5)

(Glass)

KRASOTKINA, N.I.

M. Sh. Sh. minimeter for measuring the thermal expansion of various materials. Trudy LTI no.49:119-121 '58. (MIRA 15:5)
(Expansion (Heat))

KRASOTKINA, N. I.

15(2)
AUTHORS: Voronin, N. I., Krasotkina, N. I. SOV/131-59-3-9/18

TITLE: Refractory Lining for Cyclonic Combustion Chambers With Liquid Slag Discharge (Ogneuporнaya futerovka dlya tsiklonnykh kamer sgoraniya s zhidkim shlakoudaleniyem)

PERIODICAL: Ogneupory, 1959, Nr 3, pp 129-134 (USSR)

ABSTRACT: The stability of several refractories was investigated under laboratory conditions and the most stable ones were tested in cyclonic combustion chambers in the stands of the Vsesoyuznyy teplotekhnicheskiy institut (VTI) im. Dzerzhinskogo (All-Union Thermotechnical Institute imeni Dzerzhinskiy) and the Tsentral'nyy kotloturbinnyy institut (TsKTI) im. Polzunova (Central Institute of Boilers and Turbines imeni Polzunov). The experiments were carried out in conformity with OST NKTP 3270, apart from the testing temperatures which were chosen to be 1500-1600° coal cinders being used in this connection. The curves of the melting temperatures of mixtures of slag and refractory material are shown on the figure. Table 1 shows the corroding by the slag and the grinding property of the refractories. The experiments proved that only the refractory carborundum products are not corroded by slag. Further, also carborundum and chromite linings (PKhM-6) were tested (Table 2). From the substance

Card 1/2

Refractory Lining for Cyclonic Combustion Chambers With Liquid Slag Discharge

which was made at the recommendation by Novikov and Smirnova carborundum bricks were produced and tested in a combustion chamber; the result was good (Table 3). Conclusions: carborundum bricks are suited as lining of cyclonic combustion chambers with liquid slag discharge. The lining of the chambers with carborundum products instead of plaster is regarded as being of advantage. The carborundum bricks must be made by means of pressing from masses which do not contain silicon and ferrosilicon.-There are 1 figure, 3 tables, and 10 references, 8 of which are Soviet.

ASSOCIATION: Vsesoyuznyy institut ogneuporov
(All-Union Institute of Refractories)

KRASOTKINA, N.I.

81928

S/131/60/000/07/06/006
B021/B058

15.2220

AUTHORS: Voronin, N. I., Krasotkina, N. I., Smirnova, V. A.

TITLE: Refractory Carborundum Products With Nitride Binding Materials

PERIODICAL: Ogneupory, 1960, No. 7, pp. 329 - 334

TEXT: The properties of the refractory carborundum products depend in many respects on the binding materials used. The authors conducted investigations in order to obtain refractory carborundum products with nitride binding materials. After drying, the pressed samples were fired at 1400-1600°C in the electric furnace with continuous nitrogen supply (Fig. 1) and in the oil heated furnace covered with coke, with or without addition of sand, respectively. The nitrogen content in the samples increases with the increase of the stay period at firing temperature, as can be seen from Fig. 2. The analysis was carried out by A. L. Razzhivina (Ref. 1). The properties of the samples after firing are mentioned in Table 1, their firing covered with coke being regarded as more suitable. The influence of silicon on the properties of the samples, after their firing covered with coke, at 1600°C is mentioned in Table 2 and Fig. 3.

Card 1/3

Refractory Carborundum Products With Nitride Binding Materials

S/131/60/000/07/06/006
B021/B058

The investigation showed that a maximum of up to 50% of silicon can be introduced into the mass for the purpose of producing high-quality refractory carborundum products with nitride binding materials. The dependence of the mechanical durability and porosity of the samples on their firing temperature is represented in Fig. 4. The synthetic samples with a content of 70% silicon carbide and 30% silicon underwent a chemical and radiographic analysis as well as a microscopic investigation, after firing in nitrogen and covered with coke. The nitrogen content was determined by A. L. Razzhivina; the microscopic and radiographic investigations were conducted by A. N. Alekseyeva and S. P. Shmidt-Fogelevich (Ref. 2). The investigation results of the samples after firing are mentioned in Table 3. The properties of the refractory carborundum products with nitride and silica binding materials are shown in Table 4, the nitride binding materials having proved to be the better ones. Practical experiments were conducted with them in the gas turbine installation of the Tsentral'nyy kotloturbinnyy institut im. Polzunova (Central Boiler and Turbine Institute imeni Polzunov). The authors state finally that high-quality refractory carborundum products with nitride binding materials can be obtained by firing in a nitrogen current and in flame furnaces

Card 2/3

89980

S/131/61/000/004/001/003
B105/B202

15 2200 1275 1142

AUTHORS: Voronin, N. I., Krasotkina, N. I., Stavorko, A. P., Mil'shenko, R. S.

TITLE: Experimental industrial batches of carborundum refractories with silicon nitride binders

PERIODICAL: Ogneupory, no. 4, 1961, 157-163

TEXT: The authors study carborundum refractories with silicon nitride binders. The production method has been developed at the Vsesoyuznyy institut ogneuporov (VIO) (All-Union Institute of Refractory Materials) and tested under industrial conditions at the Semilukskiy zavod (Semiluki Works) in cooperation with the VIO. A test batch of these products was produced with the masses being burnt at 1500°C. This batch was designed for firing with anthracite coal of a particle size of from 2 to 8 mm. The following parameters have to be taken into account when producing the industrial batches: effect of the amount of sulfite alcohol slops and the humidity of the mass on the quality of the blanks; effect of various modes of introducing the blanks into the furnace on

Card 1/9

the properties of the products; effect of the duration of burning on the properties of the products. The mass consisted of black carborundum nos. 24, 30, 120, 150, crystalline silicon KP-1 (KR-1) with grains of a size up to 0.06 mm. At a pressure of 5-6 atm products with dimensions of 240 × 50 × 50 mm were rammed from the masses containing 80-70% SiC and 20-30% Si. The composition of the masses and the properties of the blanks after ramming are given in Table 1. The good blanks were dried on air during five to seven days. Subsequently, they were burnt in the tunnel furnace in ceramic and carborundum casings and in the muffle furnace. Porosity of the products after burning was 11-14%. Compressive strength and properties of the burnt products are given in Tables 4 and 5, respectively. The free silicon content in the products impairs their strength as was observed in earlier investigations. Table 6 shows the indices of the test batch as well as of the carborundum products with silicon binders of the Semiluki Works. The chemical analysis was made by K. S. Kolobova, A. N. Alekseyeva studied the ground sections and the immersion. The chemical analysis and the study of the microstructure showed that with low burning rate only 2.7% of silicon remains in free state, its major part, however, is transformed into

Experimental industrial batches ...

silicon nitride and silicon carbide. Conclusions: The production technique of carborundum refractories with silicon nitride binders which has been developed by the VIO and in the Semiluki Works warrants higher qualities than that with the ordinary silicon binders. Final conclusions concerning the quality of carborundum refractories with silicon nitride binders can be drawn only after checking their working stability. The editors add that the homogeneity of the products from different muffles and the change of the properties of the products with free silicon at high temperatures must be studied in the oxidation medium. A method of eliminating free silicon must be developed. There are 3 figures, 7 tables, and 1 Soviet-bloc reference.

ASSOCIATION: Vsesoyuznyy institut ogneuporov (All-Union Institute of Refractory Materials) Voronin, N. I., Krasotkina, N. I.; Semilukskiy ogneupornyy zavod (Semiluki Works of Refractory Materials) Stavorko, A. P., Mil'shenko, R. S.

89980

S/131/61/000/004/001/003
B105/B202

Experimental industrial batches ...

Legend to Table 1: A) composition; 1) carborundum, %; 2) silicon 0.06 mm, %; 3) sulfite alcohol slops; 4) humidity of the rammed mass; B) characteristic values of the blank; 5) volume weight, g/cm^3; 6) amount of waste, %; 7) cause of waste; a) transverse cracks; b) longitudinal cracks; c) various

Таблица 1

А Состав масс и свойства сырца

№ масс	А) Состав масс: карборунд, % (1): № 24, 30	№ 120, 150	кремний 0.06 мм (2)	с. с. б.: плотность г/см³ (3)	сухой остаток %	влажность массы при трамбовании, % (4)	Б) Характеристика сырца: объемный вес г/см³ (5)	количество брака % (6)	причина брака (7)
1	56	24	20	1,29*	—	1,5	2,7	50	Поперечные трещины (a)
2	56	24	20	1,28	6,2	3,3	2,7	40	Продольные трещины (b)
3	56	24	20	1,28	5,1	3,5	2,7	30	» »
4	56	24	20	1,28	5,1	2,0—1,5	2,7	10	» »
5	56	24	20	1,27	4,0	2,0—1,5	2,7	>1	Разные (c)
6	49	21	30	1,27	4,5	2,0—1,5	2,6—2,5	2—5	»

Card 4/9

S/131/61/000/004/001/003
B105/B202

Experimental industrial batches ...

Legend to Table 4: compressive strength $\sigma_{сж}$ in kg/cm^2 after burning in the tunnel furnace with 18 lorries per shift; 1) no. of the mass; 2) mean value;

Таблица 4

Предел прочности изделий при сжатии кг/см², после обжига в туннельной печи с проталкиванием 18 вагонеток в смену и дополнительной выдержкой на 47-й позиции

(1) № массы: $\sigma_{сж}$, кг/см²			
1	2	3	средний (2)
1290	1404	785	1159
1184	1140	1231	1183
1212	1334	1461	1336
1280	1170	730	1060
1400	—	940	1170
892	890	1440	1074

Card 5/9

Experimental industrial batches ...

Legend to Table 5: properties after burning in the tunnel furnace with 16 lorries per shift: 1) water absorption, %; 2) volume weight, g/cm^3; 3) porosity, %; 4) compressive strength of specimens taken from various points of the product; 5) mean value; 6) Si content in the mass;

Card 6/9

S/131/61/000/004/001/003
B105/3202

Experimental industrial batches ...

Таблица 5

Свойства изделий после обжига в туннельной печи при проталкивании 16 вагонеток в смену на позициях 40—51

Водопоглощение %	Объемный вес г/см³	Пористость %	Предел прочности при сжатии образцов из разных мест изделия, кг/см²				
			№ 1	№ 2	№ 3	№ 4	средний
1	2	3	4				
Содержание Si в массе 20%							
—	—	—	880	—	1616	1812	1436
4,3	2,64	11,4	1530	1310	1096	—	1312
—	—	—	840	1640	—	1480	1320
4,3	2,70	11,5	1750	1823	1824	1623	1756
—	—	—	1250	1610	1883	2380	1780
—	—	—	1520	1314	1461	980	1319
Содержание Si в массе 30%							
—	—	—	804	1540	1670	1133	1287
—	—	—	—	1250	830	1530	1180

Card 7/9

89980

Experimental industrial batches ... S/131/61/000/004/001/003
B105/B202

Legend to Table 6: initial composition of the masses and indices of the products of the test batch: 1) composition of the masses, %; 2) method of intruction into the furnace; 3) number of lorries per shift; a) good products; 4) number of pieces; 5) total weight, kg; 6) volume weight, g/cm^3; 7) porosity, %; 8) compressive strength kg/cm^2; 9) temperature at the beginning of destruction; b) experimental results; c) flat; d) standing; e) industrial products;

Card 8/9

Experimental industrial batches ...

S/131/61/000/004/001/003
B105/B202

Исходный состав масс и показатели изделий опытной партии

Таблица 6

1 Состав масс, %		2	3	4	5	ⓐ Годные изделия 6	7	8	9
SiC	Si	Садка	Чи ло ваговток, при талкивае мых в печ	штук	общий вес кг	объемный вес, г/см³	порис тость %	$\sigma_{сж}$ кг/см²	температура начала разрушения, °С
ⓑ Опытные изделия									
80	20	На плашку ⓓ	16*	1589	2782	2,68—2,74	8—10	1300—1800	>1800
80	20	» »	18**	590	1032	2,68—2,70	10—13	1000—1300	>1800
80	20***	» »	18	1160	1960	2,67—2,50	11—14	800—1000	—
70	30	На торец ⓔ	18	450	756	—	—	800	—
70	70	На плашку ⓒ	16*	174	283	2,68—2,70	10—13	1000—1300	—
		» »	18	423	710	2,68—2,70	10—13	500—800	—
ⓒ Промышленные изделия									
100	—	—	18	—	—	2,35—2,50	18—24	300—700	1530

Card 9/9

1

27599
S/131/61/000/010/002/004
B130/B101

15.2240

AUTHORS: Veronin, I. I., and Krasotkina, N. I.

TITLE: State of production and possibilities of quality improvement of refractory carborundum materials

PERIODICAL: Ogneupory, no. 10, 1961, 461 - 465

TEXT: Refractory carborundum materials (I) manufactured at present are discussed on the basis of published data. The production of (I) with silicon nitride binder is mentioned and proposed for industrial use. Previously manufactured I with alumina binder are not sufficiently resistant in oxidizing medium. The I produced at present with silica binder are better. Their manufacture is easier as they are fired in an open flame. There is one disadvantage: products of large dimensions cannot be manufactured because a glass film forms on the surface which prevents air from passing through. Thus, the inner density and strength are reduced. When coating I with "Vanal" ($Al_2O_3 + V_2O_5$), the oxidation resistance may be trebled. Endeavors are made to produce very strong I by hot pressing. As to the use of silicon nitride as binder, the authors

Card 1/2

State of production and...

refer to their study published in the Byull. nauchno-tekhnicheskoy informatsii, VIO, 1959 no. 4 (24). In 1959, an experimental batch of carborundum with binding of nitride and cubical carbide of silicon was produced at the Semilukskiy zavod (Semiluki Plant) according to a procedure of the Vsesoyuznyy institut ogneuporov (All-Union Institute of Refractory Materials). A report on this experiment was made by I. S. Kaynarskiy and E. V. Degtyareva in "Ogneupory", 1960, no. 4. I with silicon nitride binding are stable to fluoride-containing melts of aluminum electrolysis. There are 1 table and 32 references: 18 Soviet and 14 non-Soviet. The four most important references to English-language publications read as follows: H. Read, F. Rock, H. Schroeder, W. Wroten. Industr. a. Engineering Chem., 1955, 47, no. 12; I. Collins, K. Cerby, J. Metals Ind., 1956, Nr. 7; R. A. Alliegro et al., Journ. Amer. Cer. Soc., 1956, no. 11; R. W. Brown, C. R. Landback, Journ. Amer. Chem. Soc., 1959, no. 7.

ASSOCIATION: Vsesoyuznyy institut ogneuporov (All-Union Institute of Refractory Materials)

VORONIN, N.I.; KRASOTKINA, N.I.

Phase composition of carborundum refractories with a bonding of silicon nitride. Ogneupory 27 no.10:463-468 '62. (MIRA 15:9)

1. Vsesoyuznyy institut ogneuporov.
(Refractory materials--Optical properties)
(Electron microscopy)

VORONIN, N.I., inzh.; KRASOTKINA, N.I., inzh.; MARSHAK, Yu.L., inzh.; SOLOV'YEV, A.M.; PSHENKO, V.A., inzh.; KULIK, A.I., inzh.

Use of carborundum packing compounds for lining furnaces with liquid slag removal systems. Elek.sta. 33 no.12:2-5 D '62. (MIRA 16:2)

(Boilers) (Furnaces)

VORONIN, N.I., doktor tekhn.nauk; KRASOTKINA, N.I., kand.khimicheskikh nauk; YUDIN, V.F., kand.tekhn.nauk

Fireproof electric insulation coating for steel pipe in heating devices. Stek.i ker. 20 no.2:32-34 F '63. (MIRA 16:2)

1. Vsesoyuznyy institut ogneuporov (for Voronin, Krasotkina).
2. TSentral'nyy nauchno-issledovatel'skiy i proyektno-konstruktorskiy kotloturbinnyy institut imeni Polzunova (for Yudin).
(Ceramics) (Protective coating)
(Electric heating)

VORONIN, N.I.; KRASOTKINA, M.I.; KULIK, A.I.; KARMANOVA, T.S.; LEVIN, G.Ye.; SIZIN, P.N.

Refractory materials and ramming mixtures for high-pressure steam-boiler furnaces. Ogneupory 28 no.5:212-218 '63. (MIRA 16:6)

1. Vsesoyuznyy institut ogneuporov (for Voronin, Krasotkina). 2. Chasov-Yarskiy kombinat ogneupornykh izdeliy (for Kulik, Karmanova). 3. Mironovskaya gosudarstvennaya rayonnaya elektrostantsiya (for Levin, Sizin).

(Refractory materials)
(Boilers—Design and construction)

S/0131/64/000/005/0232/0237

ACCESSION NR: AP4038904

AUTHORS: Krasotkina, N. I.; Voronin, N. I.; Levchuk, V. V.

TITLE: Siliconized graphite products for the protection of immersion thermocouples in measuring the temperature of liquid steel

SOURCE: Ogneupory*, no. 5, 1964, 232-237

TOPIC TAGS: refractory material, silicon carbide, thermocouple

ABSTRACT: The initial step in the production of protective thermocouple points consisted of processing hollow graphite cylinders 120 mm long with a 15-mm outside diameter and 6-mm inside diameter. Graphite rods 400 mm long and 50 mm in diameter were also turned. The cylinders and rods were fired in silicon vapors at 1600C. This caused the graphite pores to be filled with silicon carbide, the formation of which was facilitated by a 5% admixture of ammonium chloride. The siliconized points and rods were tested in 20-ton carbon-arc furnaces of the "Electrostal'" plant by being immersed in the molten steel at 1600-1700C and then being cooled in the air. During the immersion, the lower part of the block was in the metal, the middle portion--in the slag, and the upper part--above it. The siliconized points withstood 6-8 immersions of 20 to 30 seconds each, with a loss of 0.01-0.06 mm/sec. To prevent the separation of free silicon out from the pores, the points were fired

Card 1/2

ACCESSION NR: AP4038904

in vacuum at 1800C. Such points were tested in the oxidizing and the reducing stages of smelting. The temperature readings obtained with these were checked against those given by a thermocouple with quartz points. It was found that more time was needed to record the temperature during the reducing than during the oxidizing stage. Preheating the thermocouple to 1200-1300C prior to immersion corrected this defect and permitted a longer service period for the points. V. M. Vinogradov, Yu. Ye. Yefroymovich, V. I. Konyashin, I. A. Nazarkin, B. A. Oleznyuk, S. F. Polunin, and O. G. Filin participated in the work. Orig. art. has: 5 charts and 6 tables.

ASSOCIATION: Vsesoyuzny*y institut ogneuporov (All-Union Institute of Refractory Materials)

SUBMITTED: 00 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: MT NO REF SOV: 011 OTHER: 000

Card 2/2

KRASOTKINA, N.I.; VORONIN, N.I.

Effect of firing conditions and additions of scale on the homogeneity of carborundum products with a silica bonding. Ogneupory 29 no.7:322-325 '64. (MIRA 18:1)

1. Vsesoyuznyy institut ogneuporov.

KRASOTKINA, N.I.; VORONIN, N.I.; BARSKAYA, I.S.

Use of ceramic regenerators in soaking pits. Ogneupory 29 no.10: 451-455 '64. (MIRA 18:7)

1. Vsesoyuznyy Institut ogneuporov.

KRASOTKINA, T.A.

A.N.Krylov's correspondence with S.O.Makarov, I.P.de-Kolong, N.E. Zhukovskii and others. Published by T.A.Krasotkina. (MLRA 9:12) Trudy Inst.ist.est.i tekh.15:54-168 '56.
(Krylov, Aleksei Nikolaevich, 1863-1945)
(Makarov, Stepan Osipovich,1848-1904)
(Zhukovskii, Nikolai Egorovich, 1847-1925)

KRASOTKINA, T.A.

L. Euler's correspondence with J. Stirling. Ist.-mat. issl. no.10:117-158 '57. (MIRA 11:1)

(Euler, Leonhard, 1707-1783)
(Stirling, James, 1696-1770)

KRASOTKINA, T.A.

From the history of educational undertakings of the St.Petersburg Academy of Sciences in the 18th century. Trudy Inst.ist. est.i tekh. 31:364-389 '60. (MIRA 13:8)

1. Nauchnyy sotrudnik Instituta istorii yestestvoznaniya i tekhniki AN SSSR.
(Leningrad--Learned institutions and societies)

GVOZDEV, V. D.; SVYATOV, V. M.; KRASOTKINA, T. A.

Drying of thin sheet fiber in a fluidized bed of an inert granular material. Izv. vys. ucheb. zav.; khim. i khim. tekh. 5 no.5:832-839 '62. (MIRA 16:1)

1. Ivanovskiy khimiko-tekhnologicheskiy institut, kafedra khimicheskogo mashinostroyeniya.

(Fibers--Drying) (Fluidization)

GOKHSHTEYN, D.P., doktor tekhn.nauk, prof.; KRASOTOV, A.I., kand.tekhn.nauk, dotsent

Aspects of regenerative feed-water heating in units with intermediate superheating. Energomashinostroenie 4 no.4:28-31 Ap '58. (MIRA 11:7)

(Steam turbines)

Krasotskaya S.N.

AUTHOR: Krasotskaya, S. N. 126-2-7/35

TITLE: On fulfilling the additive principle for the magnetization intensity in complex alloyed ferrites. (O vypolnenii printsipa additivnosti dlya intensivnosti namagnichivaniya v slozhnolegirovannykh ferritakh).

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol.5, No.2, pp. 241-245 (USSR)

ABSTRACT: The additive principle is verified for the magnetization of complicated ferrites with a composition corresponding to that of the alloying elements of high speed steel and the martensite produced by hardening such steel. The verification was carried out on the basis of comparison of calculated magnetization data for the binary systems Fe-W, Fe-V, Fe-Cr with experimental data on the magnetization of complex ferrites Fe-W-V-Cr. For the experiments two ferrites were selected, the compositions of which are given in Table 1, p.242. The contents of the alloying elements of one of these corresponded to the contents of the high speed steel P18; the contents of the alloying elements in the second ferrite corresponded approximately to the respective contents in the martensite, produced in the same steel by hardening, in accordance with the data published

Card 1/3

On fulfilling the additive principle for the magnetization intensity in complex alloyed ferrites.

by Nikanorov, M.A. (Ref.6). The influence of each alloying element on the magnetization intensity was determined on specimens of tungsten ferrites containing 0.16 and 16.85 wt % W, vanadium ferrites containing between 0.42 and 4.67% V and chromium ferrites containing between 0.4 and 20% Cr; the C content was the same for all the ferrites, 0.05%, and was not taken into consideration. The results are plotted in graphs and entered in tables. It can be seen from Table 2 that the calculated and experimental values of the magnetization intensity are in good agreement and the divergence between these values are within the limits of experimental error. Therefore, it can be assumed that for the concentrations of alloying elements under consideration the additive principle is valid. For a relatively wide range of steels containing W, Cr and V, within the limits not exceeding the respective contents of the ferrite No.2(Table 1) of the experiments, the additive principle can be assumed valid in calculating the magnetization intensity of the ferrite standard, when determining the quantity of residual austenite. For high tungsten steels the additive

126-2-7/35

On fulfilling the additive principle for the magnetization intensity in complex alloyed ferrites.

principle should be used with some caution since the composition of the α-phase has not been accurately established.
There are 3 figures, 3 tables and 7 references, 5 of which are Slavic.

SUBMITTED: May 15, 1956.

ASSOCIATION: Gor'kiy Physico-Technical Research Institute. (Gor'kovskiy Issledovatel'skiy Fiziko-Tekhnicheskiy Institut).

AVAILABLE: Library of Congress.

Card 3/3

S/137/61/000/010/033/056
A006/A101

AUTHOR: Kraeotskaya, S.N.

TITLE: The effect of vanadium and tungsten on carbide forming processes during the tempering of steel

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 13, abstract 10I96 (V sb. "Metallovedeniye i term. obrabotka", Gor'kiy, 1959, 117 - 129)

TEXT: The magnetic method was used to study the effect of W and V on processes of C redistribution at low and medium tempering, redistribution of alloying elements and the formation of special carbides at high tempering in steels containing (in %): C 0.18 - 1.09; V 0.1 - 4.09 and W 0.58 - 18.09. It was established that during tempering of V and W steels, first ε-carbide is formed which is stable within a temperature range of 100 - 200°C at holding times up to 100 hrs and up to 300°C at holding $\leq$ 1 hour. After 100 hour holding at 200°C or 1 hour at 250°C, χ-carbide is formed which is stable up to 500-600°C. In W-steel, containing $\geq$ 13% W, the ε-carbide is degenerated directly

Card 1/2

-The effect of vanadium and tungsten ... S/137/61/000/010/033/056
A006/A101

into cementite, omitting the χ-phase. Diagrams are plotted showing the temperature ranges of stability of carbide phases during the tempering of W and V steels. There are 5 references.

T. Fedorova

[Abstracter's note: Complete translation]

Card 2/2

S/137/61/000/012/135/149
A006/A101

AUTHORS: Apayev, B.A., Krasotskaya, S.N.

TITLE: An experimental method of calculating magnetization of carbon steel martensite

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 12, 1961, 39, abstract 12I306 (V sb. "Metallovedeniye i term. obrabotka", Gor'kiy, 1959, 130 - 136)

TEXT: An experimental method is proposed to determine magnetization of a martensite standard from the effect of reducing the magnetization of a quench-hardened specimen at the initial stages of its low-temperature tempering. It is assumed that for a certain moment of the low-temperature tempering (100-200°C) only martensite is the source of carbide phases, whose singling-out reduces magnetization. Therefore the decrease of magnetization observed is proportional to the volumetric martensite percentage in the specimen. This indicates the possibility of using conventionally quench-hardened specimens to obtain tempered martensite standards. The material investigated was carbon steel, containing from 0.4 to 1.2% C. It is shown that the magnitude of maximum magnetization

Card 1/2

An experimental method ...

S/137/61/000/012/135/149
A006/A101

reduction, as a function of the C percentage, was practically equal for all tempering temperatures, but the rate of martensite decomposition increased with higher temperatures. It is shown that the nature of preliminary quenching has no marked effect on the content of residual austenite after processing in liquid O. Data on the percentage of residual austenite are in agreement with results obtained by Roberts who employed a precision roentgenostructural method. There are 12 references.

I. Nikitina

[Abstracter's note: Complete translation]

Card 2/2

APAYEV, B.A., kand. fiz.-mat.nauk; KRASOTSKAYA, S.N., inzh.; YAKOVLEV, B., inzh.

Effect of alloy elements on the stability of martensite during low-temperature tempering. Izv. vys. ucheb. zav.; chern. met. 2 no.4:89-92 Ap '59. (MIRA 12:8)

1.Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut. Rekomendovano Uchenym sovetom Gor'kovskogo issledovatel'skogo fiziko-tekhnicheskogo instituta.
(Steel alloys—Metallography) (Tempering)

18(3), 18(7)
AUTHOR: Krasotskaya, S. N.

507/163-59-2-35/48

TITLE: Formation Process of Carbide in the Tempering of Tungsten- and Vanadium Steels According to Data of the Magnet Analysis (Protsess karbidoobrazovaniya pri otpuske vol'framovykh i vanadiyevykh staley po dannym magnitnogo analiza)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 2, pp 194-201 (USSR)

ABSTRACT: The influence of tungsten and vanadium on the distribution of carbon in the tempering of the steel alloys and the carbide formation in the tungsten- and vanadium steels was investigated by the method of the magnet phase analysis. The chemical composition of the investigated steel samples is given in tables 2 and 1. The hardened samples were tempered in the temperature interval of 100-650° and the tempering time changed between 5 minutes and 100 hours. The phase composition of the steels was detected from the course of the curves I_s (T). The influence of tungsten and vanadium on the formation and the stability of the iron carbide phase was investigated. The carbide phase and the change of the phase composition

Card 1/4

Formation Process of Carbide in the Tempering of Tungsten- and Vanadium Steels According to Data of the Magnet Analysis

with the temperature rise and tempering time have in all investigated tungsten steel samples the same character. The χ-phase is stable in the temperature interval of 100-200°. Its stability is reduced above 200°. The stability of the carbide phase in the steel samples (Figs 1 and 2) is reduced with the increase of the tungsten content in the steel samples. The decomposition of ε-carbide leads to the formation of γ-carbide. The change in the quantity of cementite was investigated with the increase of the tungsten content and the results are given in figure 3. The χ-carbide phase is produced in vanadium steel in the case of tempering in a temperature interval of 100-300°. The χ-carbide formation increases with the rise of the vanadium content. The production of special carbides under the influence of tungsten and vanadium showed the production of carbides of the composition $Fe_lW_mC_n$ and V_mC_n. The carbide production process in tungsten and vanadium steels was given in the diagrams 4 and 5 according to data of the magnet analysis. The production of

Card 2/4

Formation Process of Carbide in the Tempering of Tungsten- and Vanadium Steels According to Data of the Magnet Analysis

SOV/163-59-2-35/48

hexagonal and orthorhombic intermediate phases in iron alloys was investigated by the electron-graphic method and the carbide phases are given in figures 6 and 7. The radiographs show that a carbide phase with hexagonal lattice occurs at a tempering temperature of 150° in the steel sample of the type 10V20. The carbide phase is produced with an orthorhombic lattice at a tempering temperature of 250°. Grating constant between the orthorhombic and the hexagonal phase was detected and is given in table 4. The hexagonal lattice is an ε-phase which has a Curie point at 380°. The orthorhombic lattices are a χ-phase with a Curie point at 265°. There are 7 figures, 4 tables, and 6 Soviet references.

ASSOCIATION: Issledovatel'skiy fiziko-tekhnicheskiy institut pri Gor'kovskom gosudarstvennom universitete (Physico-technical Research Institute at the Gor'kiy State University)

Card 3/4

AUTHORS: Apayev, B.A. (Cand.Phys.Mat. Sciences), SOV/129-59-6-1/15
Krasotskaya, S.N. and Makarychev, V.N. (Engineers)

TITLE: On the Correspondence of the Kinetics of Decomposition of Residual and Supercooled Austenite in Alloy Steels (O sootvetstvii kinetik raspada ostatochnogo i pereokhlazhdennogo austenita v legirovannykh stalyakh)

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1959, Nr 6, pp 2-6 (USSR)

ABSTRACT: The aim of the work described in this paper was to obtain comparative data on the kinetics of decomposition of residual and supercooled austenite, and also to elucidate the influence of the speed of heating on the decomposition of residual austenite during tempering for a large number of alloy steels (Refs 1-6). The investigations were carried out on tungsten, vanadium, chromium and molybdenum steels, for which the contents of carbon and of alloying elements and also of the residual austenite, are entered in Table 1, page 2. After preliminary homogenization annealing at 1200 °C for 6 hours, specimens of 4 mm dia and 40 mm length were quenched in oil. The process of isothermal decomposition of residual austenite was studied

Card1/5

at the tempering temperatures 300 to 650 °C, in steps of 50°C, with holding times at each temperature of 60 minutes in molten tin. The investigations were carried out magnetically by means of a MAG 51 instrument which enabled following phase changes in the specimen from the instant of charging it into the bath up to the end of holding it at the given temperature, and also during subsequent cooling. For each tempering temperature a decomposition isotherm was recorded in coordinates of instrument readings (α) versus time (τ). For each temperature the time of heating the specimen through to the bath temperature, i.e. the non-isothermal range of the process, was evaluated from the time taken from the instant of charging the annealed specimen into the bath up to the instant of termination of changes in the magnetization values. For bath temperatures between 300 and 650 °C the heating time varied between 5 and 12 seconds. The decomposition of supercooled austenite was studied in the temperature range 300 to 700 °C, whereby the heating temperature for quenching was 1100 °C for

all the tested steels; liquid tin served as the isothermal medium. The results confirm that Mo, W and V, have little influence on the stability of residual austenite for a wide range of concentration of these alloying elements (up to 18% W, up to 4% V, up to 2% Mo). No increase in the stability of the austenite was observed in chromium steels with up to 4% Cr. Diagrams of transformation of the residual and supercooled austenite for several of the tested steels are reproduced in Figs 1 - 5. It was found that the kinetics of transformation of the residual austenite and the influence of alloying elements on this process depend on the tempering conditions. For a number of steels the alloying elements did not have any considerable influence on the stability of the austenite in the case of slow heating. High heating speeds bring about a rapid change in the kinetics of decomposition of the residual austenite and it becomes comparable in character with the kinetics of isothermal transformation of supercooled austenite. Comparison of the decomposition diagrams

On the Correspondence of the Kinetics of Decomposition of Residual and Supercooled Austenite in Alloy Steels

allows the conclusion that the complicated shape of the transformation diagram of residual austenite was observed, in all the investigated steels, for contents of the alloying element which were considerably higher than in the case of supercooled austenite. This may be due to the fact that for the given volume of the specimen it was not possible to achieve isothermal conditions of tempering. In the case of specimens of smaller volumes, better correspondence can be anticipated between the individual diagrams. The zones of stability of residual and supercooled austenite were either the same for all the investigated steels, or the zone of stability of residual austenite was at lower temperatures. The diagrams of decomposition of residual austenite are particularly important when working out regimes of tempering of high alloy case-hardened steels, and also when working out tempering regimes in molten salts or metals. The results obtained by the authors of this paper indicate that the speed of heating during tempering may in some cases be of considerable importance. An

identical tempering regime may lead to different results if the heating is effected at differing speeds. Whilst in the case of slow heating the transformation is fully terminated during the process of holding at a certain temperature, during rapid heating the transformation may also proceed during the cooling. In view of the fact that for a wide range of steels the character of the kinetics of transformation of residual and supercooled austenite is similar (provided the isothermal nature of the process is conserved), there is a possibility of evolving a unified theory of the processes involved. There are 5 figures, 2 tables and 11 references, 10 of which are Soviet and 1 English.

ASSOCIATION: Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut (Gor'kiy Physico-technical Research Institute)

18(3), 18(7), 24(2)
AUTHORS: Krasotskaya, S. N. and Apayev, B. A. SOV/126-7-2-6/39

TITLE: Decomposition of Residual Austenite in the High-Speed Steel R18 (O raspade ostatochnogo austenita v bystrorezhushchey stali R18)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 2, pp 192-197 (USSR)

ABSTRACT: Residual austenite in high speed-steel decomposes on cooling after soaking at 500 to 560°C whereas in carbon and alloy steels this happens on heating. The steel R18 represents a complex system, hence it was appropriate to investigate the behaviour on tempering of the super-cooled γ-phase of simpler systems, namely, the binaries Fe-W, Fe-V and Fe-Cr; the ternaries Fe-C-W, Fe-C-V and Fe-C-Cr, and the quaternary Fe-W-V-Cr. No change in the magnetic properties of the ferrites, including the complex alloy one, were observed. This means that the presence of residual austenite is associated with carbon content. For the study of the decomposition of residual austenite in quenched steels, $I_s(t^0)$ curves were plotted for specimens during continuous heating up to 650°C and subsequent cooling in a magnetometer furnace. The

Card 1/6

heating and cooling rate was 5°C/min. Such curves are shown in Fig 1a for tungsten steels with limiting W contents (1 and 18%); in Fig 1b for vanadium steels (0.3 and 4% V); and in Fig 1B for chromium steels (4 and 8% Cr). An investigation of three systems in a concentration range corresponding to the alloy element content of the steel R18 has shown that the decomposition of residual austenite takes place during heating, being complete at 375 to 400°C. As the W, V and Cr content is increased, the stability of the residual austenite tends to increase. From the $I_s(t^o)$ curves plotted in the same way for the steel R18 it can be seen that the bulk of the austenite of this steel decomposes on cooling. However, if the heating rate is reduced to 0.3°C/min, the decomposition of the residual austenite occurs in the same manner as in the other steels, i.e. during heating, but at higher temperatures (625 to 675°C, see Fig 2). Whereas the behaviour of 8% Cr steel is similar to that of the steel R18 (see Figs 3a,b and 4a,b), that of the others investigated is different, the austenite decomposes on

Decomposition of Residual Austenite in the High-Speed Steel R18

heating and during isothermal soaking but not on cooling. This might lead to the assumption that the characteristic of decomposition of the γ-phase in high-speed steel is associated with the presence of chromium. However, austenite of the steel R18 contains only 8% Cr. This suggests that a characteristic of austenite decomposition may be due not to the absolute chromium content but to its relative concentration, i.e. the Cr/C ratio which, according to Michel and Papier (Ref 2), is 9 for steel R18. Confirmatory experiments with other steels (0.2 and 0.5% C and 4% Cr) have shown that the decomposition of residual austenite occurs only during heating and isothermal soaking. The results obtained led to the conclusion that the stability of austenite in the steel R18 during heating is due to the joint action of carbon and alloy elements. The stability of the γ-phase during isothermal soaking at the tempering temperature range of this steel may be associated with this. A study of the nature of decomposition of super-cooled austenite of W-, V-, and Cr-steels has shown that, as the alloy element content of

Card 3/6 1% carbon steel is increased, the isothermal decomposition

Decomposition of Residual Austenite in the High-Speed Steel R18

diagrams gradually change from the usual (C-shaped) to the more complex (S-shaped) ones and the temperature range of austenite stability widens. This zone becomes clearly pronounced in W-steels at a W content $\geq$ 6%, and V- and Cr-steels at a content of $\geq$ 2% of these elements respectively. Figs 5 and 6 show the change in magnetization in steels 10X40 and 10W60 respectively - 1) on isothermal soaking and 2) on repeated heating and cooling. In all the investigated steels having a zone in which the supercooled austenite is stable, the austenite is also stable in the range 500 to 550°C. If the transformation in the isothermal soaking range does not go to full completion, then decomposition of austenite (residual and supercooled) occurs during cooling. The relationship between the stability zone temperatures and kinetics of decomposition permit the conclusion that the stability of austenite and the nature of processes occuring on tempering quenched steels and isothermal decomposition of supercooled austenite are due to some common reasons which so far have not been elucidated. A comparison of the

Decomposition of Residual Austenite in the High-Speed Steel R18

kinetics of decomposition of residual asutenite on tempering the steel R18 and steels containing the same quantity of alloy elements as high-speed steel shows that on alloying the steel with W and Cr the decomposition of austenite proceeds analogously to the decomposition of austenite in steel R18. Alloying with V does not lead to the same analogy. This leads to the conclusion that the characteristics of decomposition of austenite of high-speed steel is associated with the action of Cr and W. Cr tends to raise the stability of residual austenite considerably. The complete similarity in the kinetics of austenite decomposition of high-chromium steels and steel R18 on isothermal tempering leads to the conclusion that chromium exercises the strongest influence.

There are 6 figures and 5 references, 4 of which are Soviet, 1 French.

ASSOCIATION: Issledovatel'skiy fiziko-tekhnicheskiy institut pri Gor'kovskom gosudarstvennom universitete (Physico-Technical Research Institute of the Gor'kiy

SOV/126-7-2-6/39

Decomposition of Residual Austenite in the High-Speed Steel R18

State University)

SUBMITTED: June 11, 1957

Card 6/6

18.7100

77141
SOV/148-59-9-11/22

AUTHORS: Krasotskaya, S. N., Ponomareva, M. N. (Engineers)

TITLE: Concerning the Phase Composition of Isothermally Hardened (Austempered) Samples

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1959, Nr 9, pp 111-114 (USSR)

ABSTRACT: This is a study of a phase composition of austempered samples of carbon, chromium, and tungsten steels, containing the amounts of carbon and alloying elements shown in the table.

	C	W	Cr
U8 ---	0.78	---	----
U11 --	1.12	---	----
10V10 --	1.07	1.00	----
10V40 --	1.01	4.00	----
10Kh15--	1.00	---	1.15

Card 1/5

Such a composition of steels was selected in order to trace the effect of carbon, chromium (an element which is soluble in cementite), and tungsten (an element which is practically not soluble in cementite) on the process of phase formation during austempering. Cylindrical samples 4 mm in diameter and 40 mm high were heated in the vacuum furnace: the carbon steels to 950° C, chromium steels to 1,050° C, and tungsten steels to 1,200° C, with 10 to 15 minutes holding. The samples were austempered at 200 to 500° C (over 50° C intervals) in molten tin. The holding time varied from 15 minutes to 3 hours. After holding, samples were cooled in water and their "magnetograms" (curves showing relationship between the magnetization and the temperature I_s (t) during heating the "magnetometer" in an air furnace at the rate of 4 to 5 degrees/minute) were taken (see Figs. 4 and 5).

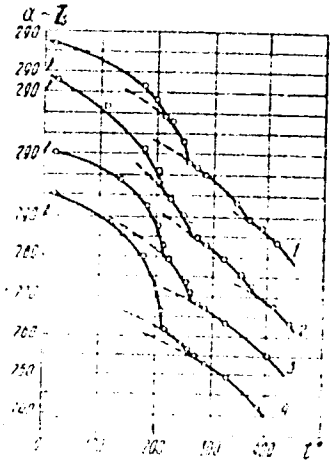


Fig. 4. Curves showing magnetic properties, "magnetograms", of steel 10V10 after austempering at 3 hours holding. Temperature of austempering: (1) 300; (2) 250; (3) 400; (4) 450° C.

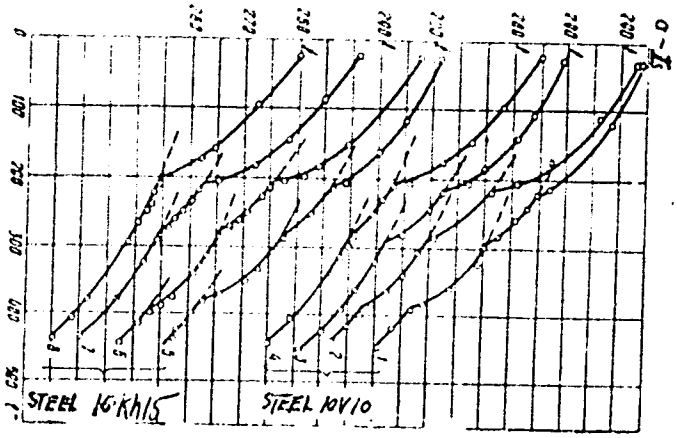


Fig. 5. Curves showing magnetic properties, "magnetograms," of steel after 1 hr tempering. Tempering temperatures: (1) 250; (2) 300; (3) 350; (4) 550; (5) 250; (6) 350; (7) 450; and (8) 500° C.

Card 3/5

Concerning the Phase Composition of Isothermally Hardened (Austempered) Samples

77141
SOV/148-59-9-11/22

The authors arrived at the following conclusions: (1) The phase composition of austempered steels is similar to the phase composition of the structure forming after hardening with tempering. (2) Their phase composition is more complex than visualized by the previous authors [Ref 1 and 2: Azintsev, Ye. G., Arbuzov, M. P., ZhTF, Vol XX, 1950; Entin, P. I., Metallovedeniye i obrabotka metallov, Nr 9, 1956]. In addition to cementite the austempered samples contained other carbide phases of iron: ε - $Fe_x C$ and χ - $Fe_x C$. (3) The shift of phases, according to their stability as temperature of austempering increases, is analogous to that for tempered steels, and can be presented as: ε $Fe_x C \longrightarrow \chi Fe_x C \longrightarrow Fe_3 C$. (4) The comparison of the present data with the results of the authors' earlier investigations regarding the effect of the content of alloying elements on temperature of stability and boundaries of existence of ε - and χ-carbides during tempering, permits one to state that during the austempering of steels the character of this effect

Card 4/5

remains unchanged. There are 5 figures; and 8 references, 7 Soviet, 1 French.

ASSOCIATION: Gor'kiy Physicotechnical Research Institute (Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut)

SUBMITTED: May 18, 1959

[illegible], [illegible] . Cand Phys-Math Sci — (diss) "[illegible] re-
[illegible] carrying in the production of [illegible]
steels," Moscow 1960, 21 pp, 200 cop.(Central Sci Res Institute of
Ferrous Metallurgy im Bardin) (KL, 45-60, 122)

KRASOTSKAYA, S.N.

82640

S/126/60/010/02/010/020
E111/E352

187100

AUTHORS: Apayev, B.A., Levina, E.I., Krasotskaya, S.N. and Pavel'yeva, A.I.

TITLE: Solubility of Alloying Elements in Cementite

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol. 10, No. 2, pp. 245 - 250

TEXT: In this work the solubility of tungsten, vanadium, chromium and manganese in the first portions of cementite produced on tempering of hardened steel was examined. The increase in their solubility with increasing tempering temperature was also studied. Published data (Refs. 10, 11) show that the solubility of alloying elements is considerably less than their contents in steel (Table 1). The present work was carried out with the following steels, all containing 1% C: 10Kh6 (0.6% Cr); 10Kh40 (4% Cr); 10G12 (1.2% Mn); 10F6 (0.6% V); 10F12 (1.2% V); 10V6 (0.6% W) and 10V20 (2% W). Chromium and manganese steels were hardened from 1150, the others from 1280 °C. Tempering was effected at 250-650 °C, specimens tempered at 450 °C being used for chemical investigation (with electrosolution by N.M. Popova's method,(Ref. 10), applying a

Card 1/3

S/126/60/010/02/010/020
E111/E352

Solubility of Alloying Elements in Cementite

a check). One of the authors (Krasotskaya - Ref 15) has shown that in molybdenum, tungsten and vanadium steels cementite is first formed at 100 °C and that after 10 hours at 250 °C martensite decomposition is practically completed. For this group of steels chemical analysis was carried out only on electrolytic residues of the tungsten and vanadium steels tempered at 250 and 450 °C for 10 hours (Table 3 shows the alloying-element content as percentage of steel sample weight). For 10Kh6, 10G12 and 10Kh40 steels the Curie point (Curves 1, 2, 3, respectively) and the alloying element content of the residue (Curves 3, 4, 6, respectively) are plotted against tempering temperatures. The results of this work contradict the ideas of some authors (Refs. 1-5), as shown in Table 4, where chromium contents of steel and residue are shown for a series of chromium steels. Whatever the alloying element, its initial solubility in cementite is far below its content in the steel; the way in which solubility changes with tempering temperature does depend on the nature of the alloying element. The solubility of the alloying elements in cementite governs their distribution (and that of carbon) between the alpha and carbide

82640
S/126/60/010/02/010/020
E111/E352

Solubility of Alloying Elements in Cementite

phases. With tungsten, vanadium and molybdenum the redistribution of carbon occurs first for most of the range; with others both carbon and alloying elements can move simultaneously and hence the elements can be present in the first portions of cementite. There are 1 figure, 4 tables and 16 references: 14 Soviet, 1 English and 1 Japanese (in English)

ASSOCIATION: Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut (Gor'kiy Physics-Technical Research Institute)

SUBMITTED: December 23, 1959

Card 3/3

S/129/61/000/003/008/011
E073/E335

18 7/96

AUTHOR Krasotskaya, S.N., Engineer

TITLE Transformation of Residual Austenite in Case-hardening Steels

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov 1961 No. 3 pp 42 - 46

TEXT The kinetics of transformation of residual austenite directly after carburisation and after case hardening was investigated for the steels [illegible] (15KhNMA) [illegible] (12Kh2N4) [illegible] (18KhNMA) [illegible] (18KhNT) and [illegible] (20KhGR). Furthermore the influence was investigated of tempering prior to quenching on the quantity of residual austenite and also the influence of sub zero treatment. Specimens 4 mm in diameter and 40 mm long were carburised in a solid carburiser consisting of 60% charcoal and 40% barium carbonate at 940 °C for 0.5 1 3 and 5 hours. Magnetic phase analysis was carried out using ballistic and dipole magnetometers. Measurement of the magnetisation before and after carburisation showed that for all grades of steel the

Card 1/6

Magnetisation decreased and this decrease was the greater the longer the duration of carburisation. The transformation of austenite was investigated during slow heating of the specimens as well as during isothermal tempering. Analysis of the character of the transformation of the residual austenite during slow heating (5 °C/min) was by measuring the change in the magnetisation as a function of the heating temperature. Fig. 1 shows the change in the magnetisation during heating, cooling and repeated heating of carburised steel 12KhN3A for carburisation times of 30 min (Curve 1) and 6 hours (Curve 2). Fig. 2 is the same for the steel 12Kh2N4 (notations same as for Fig. 1). C diagrams (of isothermal transformation of the residual austenite of carburised steels) are reproduced in Fig. 3 (top graph - steel 18KhNVA, bottom graph - steel 12KhN3A; °C versus ... sec). It can be seen that the residual austenite of carburised steels is very stable. During quenching of the carburised steels considerable quantities of residual austenite become fixed and the authors studied the behaviour

Transformation of ....

of this austenite during slow heating and during isothermal tempering. After quenching the quantity of residual austenite was between 40 and 70%. The austenite of the quenched specimens was more uniform and less stable than the austenite of the carburised specimens. Heating to 900 °C brings about a more uniform distribution of the alloying elements and of the carbon throughout the solid solution. The influence of preliminary heat treatment on the quantity of residual austenite and on the hardness after quenching was also studied. After carburisation for 6 hours normalisation at 890 °C was applied, with a soaking time of 1 hour followed by quenching at 800 °C in oil. Specimens with approximately equal quantities of austenite after carburisation were used for this treatment. The lowest quantity of austenite was observed after quenching of carburised specimens or specimens which have been normalised. Preliminary tempering prior to quenching, at 350 °C and particularly at 650 °C leads to obtaining a higher quantity of austenite and a very low hardness. The results obtained are not in agreement with those obtained

Card 3/6

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E073/E335

Transformation of ...

by Sagaradze (Ref. 2). Even under optimum conditions a considerable quantity of residual austenite will remain in the specimen. The results of investigation of the decomposition of austenite in quenched specimens have shown that the zone of intensive decomposition is at the relatively high temperature 350 - 400 °C. Obviously carburised specimens should not be tempered at such temperatures since the decomposition of the martensite base leads to a sharp drop in hardness. In the view of the author the most effective treatment is sub-zero treatment which permits obtaining the minimum quantity of residual austenite and an increased hardness. The lowest quantity of austenite and the highest hardness is achieved for the following heat treatment after carburisation: normalisation followed by quenching, followed by sub-zero treatment. There are 7 figures, 2 tables and 2 Soviet references.

Card 4/6

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S/120/61/000/003/008/011
E073/E535

Transformation of ....

ASSOCIATION: Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut (Gor'kiy Physicotechnical Research Institute)

Fig. 1:

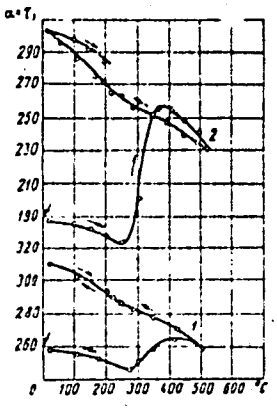
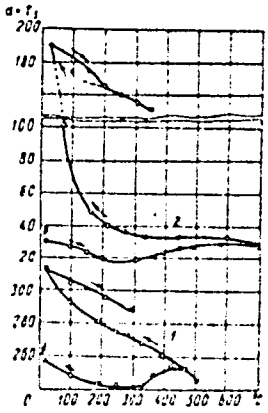


Fig. 2:



Card 5/6